

## Introduction

Prions are the causative agent of transmissible spongiform encephalopathy (TSE) diseases in mammals. Prions are notoriously recalcitrant to chemical and physical degradation and are highly persistent in the environment. Disposal of prion-contaminated bio-waste is an increasingly challenging task for agencies responsible for such operations. The composting process has proven effective for the biodegradation of recalcitrant organic contaminants, and the abundance of microorganisms and high temperatures achieved during composting have prompted interest in this process for inactivating prions. Prior research on survival of prions in composting systems is limited and inconclusive.

## Objectives

- Compost Chronic Wasting Disease (CWD) infected deer remains in a summer and winter Midwest climate
- Inactivate *E. coli* NAR as an indicator of pathogen inactivation
- Assess the composting process for CWD prion deactivation in soil, leachate and compost samples
- Assess the use of RT-QuIC for prion analyses in environmental matrices

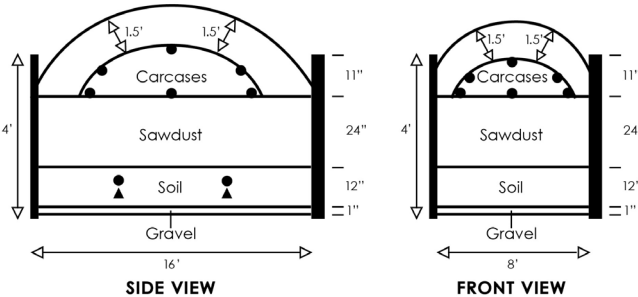


Fig 1 Research crew in PPE at the study site in Almond, WI.

## Methods

Fig 2 Diagram of a composting cell with measurements and locations of probes and carcasses, alongside a photo of a composting cell.

- Temperature probe locations
- ▲ Soil moisture probe locations



- Four cells received CWD infected deer and one cell received non-CWD-infected deer
- Composting process monitored continuously in real-time by thermocouple temperature probes
- Effluent samples taken biweekly to determine presence of *E. coli* NAR and prion movement
- The real-time quaking induced conversion (RT-QuIC) assay was used to detect presence of CWD at the University of Wisconsin-Madison
- Active composting phase for 4-6 months, followed by secondary curing phase of 3-6 months after samples were taken
- Final compost samples analyzed in accordance to United States Composting Council Seal of Testing Assurance parameters, and for *E. coli* NAR and prion inactivation

## Results & Discussion

Fig. 3 Average daily temp (°C) in all composting cells along with total sum of rainfall (mm) and average ambient air temp for trial 1.

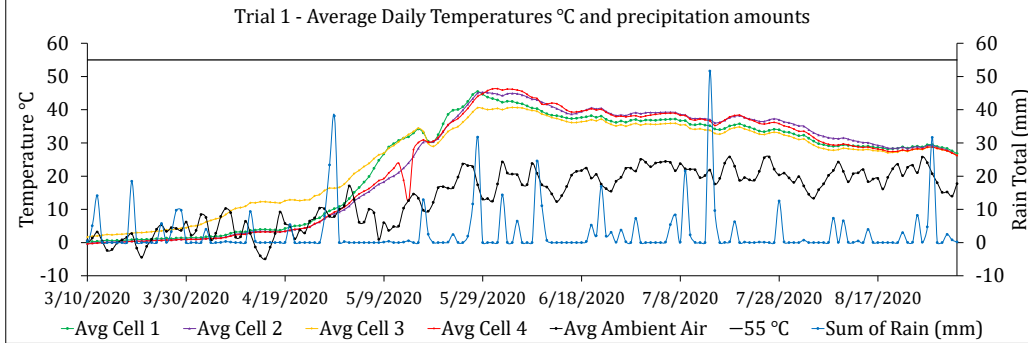


Fig. 4 Brain amyloid formation rates for trial 1.

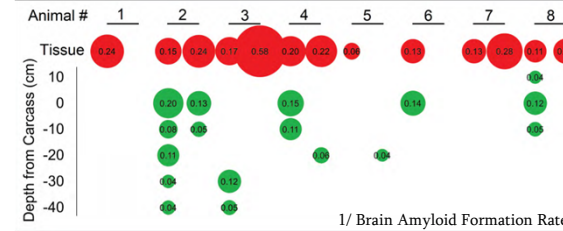


Fig. 5 Organization of carcasses during trial 1.



Fig. 6 Average daily temp (°C) in all composting cells along with total sum of rainfall (mm) and average ambient air temp for trial 2.

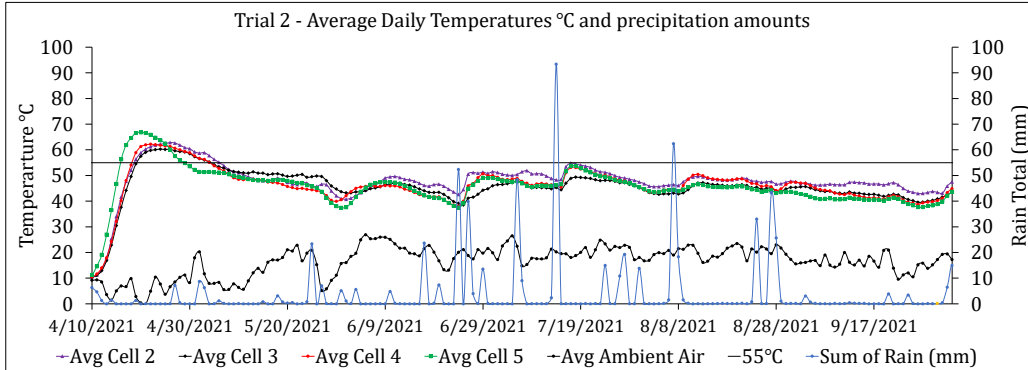


Fig. 7 Organization of butchery waste during trial 2.



Fig. 8 Brain amyloid formation rates for trial 2.

Cell #/Depth	2	3	4
10			0.05 0.04
0	0.12 0.11	0.07 0.06	0.08
-10	0.03 0.04		0.03
-20	0.04		
-30	0.05	0.03	0.05
-40	0.13 0.05		0.05 0.03